

## WHAT IS CLAIMED IS:

- 1           1. An optical multiplex transmission method comprising:  
2           accepting an optical signal group in which optical signals of a  
3           plurality of wavelengths are multiplexed, from a first optical transmission  
4           line;  
5           converting the optical signal of the first wavelength included in  
6           the optical signal group, into the optical signal of the second wavelength  
7           different from said first wavelength; and  
8           multiplexing at least one of the optical signals of the wavelengths  
9           except said first wavelength, included in said optical signal group, and  
10          said optical signal of said second wavelength, and then outputting the  
11          resulting multiplexed optical signals to a second transmission line.
- 1           2. An optical multiplex transmission method comprising:  
2           accepting a first optical signal group in which optical signals of a  
3           plurality of wavelengths are multiplexed, from a first optical transmission  
4           line, and a second optical signal group in which optical signals of a  
5           plurality of wavelengths are multiplexed, from a second optical  
6           transmission line;  
7           converting the optical signal of the first wavelength included in  
8           the first optical signal group, into the optical signal of the second  
9           wavelength different from said first wavelength;

10           multiplexing at least one of the optical signals included in said  
 11 first optical signal group, at least one of the optical signals included in the  
 12 second optical signal group, and said optical signal of said second  
 13 wavelength, and then outputting the resulting multiplexed optical signals  
 14 to a third optical signal line; and

15           multiplexing at least one of the optical signals except the optical  
 16 signals to be outputted to the third optical signal line, included in said  
 17 first optical signal group, and at least one of the optical signals except  
 18 said optical signals to be outputted to said third optical signal line,  
 19 included in said second optical signal group, and then outputting the  
 20 resulting multiplexed optical signals to a fourth optical signal line.

1           3. An optical multiplex transmission method comprising:

2           allowing a first node apparatus;

3           to receive a wavelength-multiplexed optical signal group;

4           to transmit at least one of optical signals included in the optical  
 5 signal group, to a second node apparatus connected with the first node  
 6 apparatus;

7           to convert the optical signal of first wavelength included in said  
 8 optical signal group, into the optical signal of second wavelength different  
 9 from the first wavelength; and

10           to transmit said optical signal of the second wavelength to a third  
 11 node apparatus connected with said first node apparatus.

1           4. A method wherein a node apparatus multiplexes optical

2 signals and transmits the resulting multiplexed optical signals,  
3 comprising:

4 receiving a first optical signal group from a first optical  
5 transmission line, and a second optical signal group from a second optical  
6 transmission line;

7 optically multiplexing at least one of optical signals included in  
8 the first optical signal group, and at least one of optical signals included  
9 in the second optical signal group, and then outputting the resulting  
10 multiplexed optical signals to a third optical transmission line;

11 optically multiplexing at least one of the optical signals included  
12 in each of the first and second optical signal groups, except the optical  
13 signals to be outputted to the third optical transmission line, and then  
14 outputting the resulting multiplexed optical signals to a fourth optical  
15 transmission line; and

16 converting the optical signal of first wavelength included in said  
17 first optical signal group, into the optical signal of second wavelength  
18 different from the first wavelength, and then transmitting said optical  
19 signal of the second wavelength to another node apparatus.

1 5. An optical transmission apparatus comprising:

2 an input wavelength demultiplexing unit which demultiplexes a  
3 first optical signal group including optical signals of a plurality of  
4 wavelengths inputted from a first optical fiber, into the optical signals of  
5 the respective wavelengths;

6 a wavelength multiplexing unit which multiplexes optical signals

7 of a plurality of wavelengths, and which outputs the resulting  
8 multiplexed optical signals to a second optical fiber;

9 a wavelength dropping unit which externally outputs  
10 predetermined optical signals among said optical signals of said  
11 respective wavelengths demultiplexed by said input wavelength  
12 demultiplexing unit;

13 a wavelength adding unit which outputs optical signals of  
14 predetermined wavelength in a second optical signal group including  
15 optical signals of a plurality of wavelengths externally inputted, to said  
16 wavelength multiplexing unit; and

17 a wavelength converting unit which converts the optical signal of  
18 first wavelength among said optical signals of said respective  
19 wavelengths demultiplexed by said input wavelength demultiplexing unit,  
20 into the optical signal of second wavelength different from the first  
21 wavelength, and which outputs said optical signal of the second  
22 wavelength to said wavelength adding unit.

1 6. An optical transmission apparatus comprising;

2 means for deriving at least one optical signal from within an  
3 optical signal group including optical signals of a plurality of  
4 wavelengths inputted from a first optical fiber, and for outputting the  
5 derived optical signal outside said optical transmission apparatus;

6 means for converting the wavelength of at least one of the optical  
7 signals included in the optical signal group; and

8 means for outputting said at least one of the optical signals of the

9 converted wavelength, and at least one of the optical signals which are  
10 included in said optical signal group and whose wavelengths are not  
11 converted, to a second optical fiber.

1 7. An optical transmission apparatus according to Claim 5,  
2 wherein said wavelength converting unit comprises:

3 an optoelectric conversion portion which converts said optical  
4 signal into an electric signal;

5 a switching portion which selects a connection route for the  
6 electric signal; and

7 an electrooptic conversion portion which converts said electric  
8 signal into an optical signal of specific wavelength.

1 8. An optical transmission apparatus according to Claim 5,  
2 wherein said wavelength converting unit includes:

3 a switching portion which selects a connection route for said  
4 optical signal; and

5 a specific wavelength conversion portion which converts the  
6 wavelength of said optical signal into a specific wavelength.

1 9. An optical network comprising:

2 a plurality of node apparatuses each of which includes the optical  
3 multiplexing apparatus as defined in Claim 5,

4 wherein said plurality of node apparatuses are connected in a  
5 scheme selected from the group consisting of one liner, a ring shape and a

6 mesh shape.

1           10. An optical network according to Claim 9, further comprising:  
2           means for accepting a channel connection request for connecting  
3 the first and second node apparatuses, and then determining wavelength  
4 conversion methods in said node apparatuses relevant to the connection;  
5 and  
6           means for giving commands of the determined conversion  
7 methods to the respective node apparatuses.